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ALEPISaurus BREVIROSTRIS, A NEW SPECIES OF LANCETFISH FROM THE WESTERN NORTH ATLANTIC

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Exploratory fishing for tunas in the western North Atlantic by the Fish and Wildlife Service vessel DELAWARE has revealed the presence of considerable numbers of lanceefishes, genus *Alepisaurus*. Through the courtesy of Mr. James L. Squire, I have been privileged to accompany most of these cruises. On the first two, the presence of *Alepisaurus* was recorded and stomach contents sampled, but only two specimens were saved. During the third cruise, it became apparent that two morphological types were represented, and from then on an attempt was made to measure and make counts on all possible specimens, and to preserve a large sample.

At first the possibility was entertained that the differences might be due to sexual dimorphism. Gonads were therefore examined on all preserved specimens and on a large number of fresh ones. The appearance was almost exactly the same in all specimens, indicating that sexual dimorphism was probably not a factor. This has been borne out by histological studies of the gonads, which lead me to the rather surprising conclusion that both morphological types, which I am now certain represent valid species, are hermaphroditic.

A study of nearly all type specimens and of all original descriptions leads to the conclusion that all previously described Atlantic species are conspecific with *A. ferox* Lowe. The second form is described here.

ALEPISAURUS BREVIROSTRIS, sp. nov.
(Figures 1-2)

Holotype. U. S. National Museum 186197, 682 mm. in standard length when fresh, 684 mm. preserved; taken on longline with 20-fathom buoy lines by the M/V DELAWARE at $38^{\circ} 49' N$, $64^{\circ} 02' W$, on September 13, 1957.

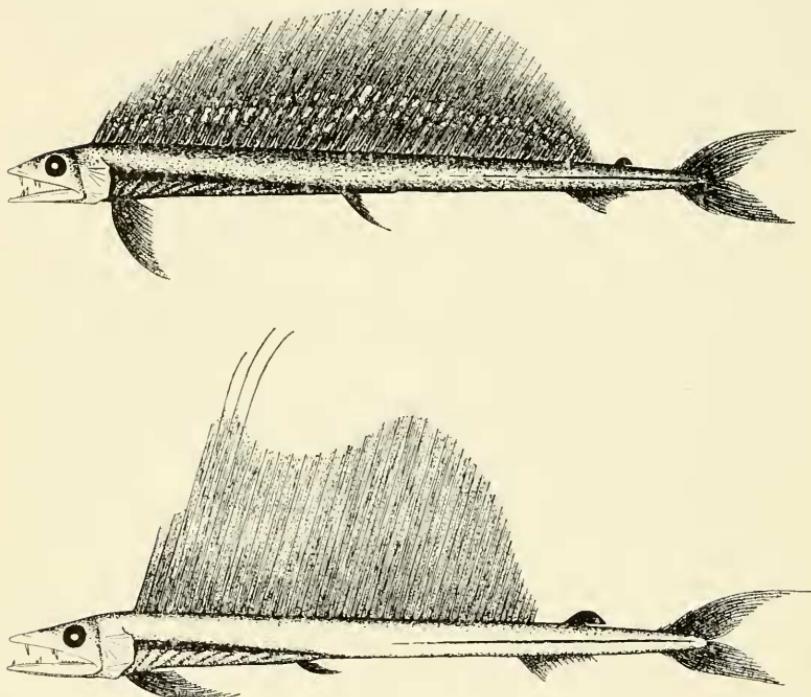


Figure 1. Left lateral view of *Alepisaurus brevirostris* (top), and *A. ferox* (bottom).

Paratypes have been distributed to the Museum of Comparative Zoology, Academy of Natural Sciences of Philadelphia, Cornell University, University of Miami Marine Laboratory, Tulane University, Scripps Institution of Oceanography, Stanford Natural History Museum, Museum of Zoology University

of Michigan, California Academy of Sciences, British Museum (Natural History), Museum National d'Histoire Naturelle Paris, and Museu Municipal do Funchal.

Diagnosis. A dark-hued species of *Alepisaurus* with a gradually areuate dorsal fin profile, the dorsal origin well forward of the rearmost margin of the operculum, a short head (6.5 or more in standard length), and a short snout (2.5 or more in head).

Description. Dorsal fin high, originating over the middle of the opercle, its longest ray (about number 25-30) about three times the greatest depth of the body; its rays flexible, easily bent and broken, not branched, joints difficult to observe, though present. Leading dorsal ray thickened, its anterior edge finely serrated. Anal fin highest at the second and third rays, the rays branched distally. Pectoral fin pointed, its middle rays longest; first ray thickened, serrated anteriorly, unbranched, the rest branched and obviously jointed. Pelvic fin also pointed, the middle rays longest, the first ray thickened, serrated anteriorly, and unbranched, the remaining rays jointed and branched. Caudal fin strongly forked, with eight procurrent rays in each lobe, ten upper principal rays and nine lowers; uppermost principal rays considerably elongated in some specimens.

Snout inclined downward more sharply than the rear of the head, its length more than 2.5 times in head length. Nostrils a little less than halfway from tip of snout to anterior edge of orbit, the anterior opening round, the posterior crescent-shaped. Upper and lower jaws subequal. Upper jaw with a row of many small thin teeth on the premaxilla, one or two large fangs on anterior palatine, about three smaller fangs on the rear of the same bone, followed by about 7-10 low, triangular teeth. Lower jaw with an anterior large fang, followed by about 10 small caniniform teeth, one to three large fangs, and about 10-15 low, triangular teeth. No teeth on poorly developed tongue. Two patches of pharyngobranchial teeth. Gill arches with 3-6 upper, 0-1 middle, 17-23 lower groups of low, spinous rakers, totaling 23-28 groups. Branchiostegals mostly 7. Eye about 5 in head length, with vertical adipose eyelids anteriorly and posteriorly. Preopercle smooth. Opercle large, sculptured with lines radiating from its antero-dorsal corner; subopercle also with striae

radiating from its anterior point; interopercle apparently absent. Interorbital space bounded by prominent parietal ridges, the area forming a flat to slightly concave surface, gradually widening posteriorly.

Body elongate, its greatest depth, at level of pectoral fins, about 12 in standard length. A low lateral keel occupying most of the rear half of each side. Lateral-line pores opening along the keel and continuing forward beyond it; lateral line on head forming prominent supraorbital, suborbital, and preoperculo-mandibular systems; supratemporal apparently lacking. Anus posterior to pelvic insertion by less than half the length of the pelvic fins.

Fin-ray counts and morphometric data are given in Tables 1 and 2.

Coloration. Body iridescent brownish-black dorsally, becoming gradually lighter laterally. Region above lateral line liberally sprinkled with both large and small melanophores, many of the former ocellated. Below the lateral line, and particularly on the belly, many small melanophores present. General coloration decidedly dark in comparison with *A. ferox*. Lateral keel black. Dorsal fin membrane iridescent black, often with a horizontal row of white spots a short distance above base. Other fins, including adipose dorsal, black. Head dark above, becoming lighter ventrally. Abdominal cavity marked externally by alternating light and dark bands, the light ones representing strips of muscle, between which the dark peritoneal lining shows through.

Visceral Anatomy. Peritoneal lining black. Liver relatively small, covering only the most anterior portions of the stomach and intestine. Stomach black, highly distensible, forming a long, blind sac. Intestine arising at the anterior end of the stomach, continuing straight, without bends, to the anus, divided at about one-third of its length into anterior thick-walled and posterior thin-walled portions. Kidneys occupying the entire length of the body cavity, lying retroperitoneally along the ventral side of the vertebral column. Ureters enter a thin-walled urinary bladder which extends about from the level of the pelvic insertion to the anus. Gonads consisting of a prominent pair of elongate, continuous ovaries, which occupy the posterior third of the body

eavity above the intestine, and a pair of thin testes, almost invisible, lying in the dorsal groove formed by the two ovaries. The ducts of the ovaries, and presumably also those of the testes, join the urinary bladder and open by a urogenital pore immediately behind the anus. Swimbladder absent.

Related Species. Other than *A. brevirostris*, the only recognized Atlantic species of the genus *Alepisaurus* is *A. ferox* Lowe. The two species are distinguishable by many characters. The most trenchant ones are shown in Table 3, and may be visualized in Figures 1 and 2. In addition to these, many less-perfect ones are demonstrable. Characters associated with head length show significant differences (snout to dorsal origin, snout to pectoral insertion, see Table 2). The pectorals average about one-fifth of the standard length in *A. brevirostris* and are slightly shorter in *A. ferox*. The eye is relatively larger in *A. brevirostris*, doubtless correlated with the shorter snout. Meristic characters show consistent modal differences: dorsal rays most commonly 42-45 in *A. brevirostris*, 39-42 in *A. ferox*; anal rays usually 14-15 vs. 15-17; pelvic rays 13-14 vs. 14-15.

Alepisaurus is common in the Pacific, but at present it is not possible to ascertain the species. I have examined seven Pacific specimens in the U. S. National Museum and find them extremely similar to, if not conspecific with *A. ferox* (see Table 1). The only disconcerting element was the low number of dorsal rays in four specimens, which indicates at least some degree of differentiation. I have seen no examples of a form resembling *A. brevirostris* from the Pacific.

Young Specimens. Five specimens, 85.0 to 190.5 mm. standard length, present a confusing array of characters which defy positive identification. Tables 1 and 2 show for these specimens many characters within or beyond the ranges displayed by adults of both *A. brevirostris* and *A. ferox*. There is obviously a great change between 200 and 500 mm. in the relative proportions, the caudal end in particular increasing proportionally greatly in this time. Presumably the shape of the head also changes, as these five are all extreme, even to *A. brevirostris*, in having short heads and snouts. I am inclined to call them all *A. ferox*, but with considerable doubt.

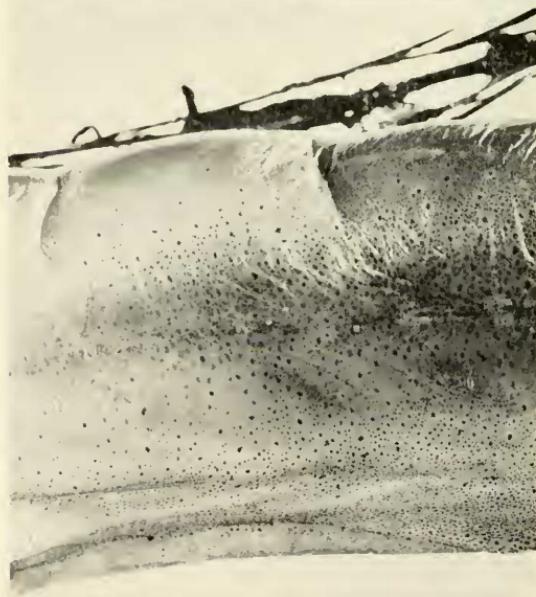


Figure 2. Photographs showing melanophore patterns of *A. brevirostris* (left), and *A. ferox* (right).
Dorsal side to the right.

Mensural Discrepancies. Counts and a few selected measurements were made at sea on most of the specimens which came aboard the M/V DELAWARE. A later check has shown that the measurements cannot be used in conjunction with others taken on preserved specimens. Among the 17 preserved specimens of each species used in the descriptions here, were 11 *A. ferox* and 16 *A. brevirostris* which were also measured at sea when fresh. In these, the measurements of standard length and head length were consistently less in preserved specimens. In *A. ferox*, the standard length of one specimen was 0.7 per cent greater, the others 1.0-16.2 per cent less, averaging 6.6 per cent less. The head lengths were 3.4-6.6 per cent less, averaging 5.1 per cent. The corresponding figures for *A. brevirostris* were: standard length 0.3 and 1.1 per cent greater in two, others 2.0-13.1 per cent less, averaging 4.5 per cent less; head length 0.5-2.8 per cent greater in three, 0.5-9.2 per cent less in 13, averaging 2.7 per cent less.

Synonymy. Previous descriptions of *Alepisaurus* leave much to be desired. Eight nominal species have been described. I believe all these descriptions refer to a single, perhaps polytypic, species. These names are discussed below.

Alepisaurus ferox Lowe, 1833. The original description was made from two specimens from Madeira (Lowe, 1835a). In all important characteristics the written description is nearest *A. ferox* as recognized in the present study, but the accompanying drawing shows an areuate dorsal fin profile, an absolute character of *A. brevirostris*. The matter was further complicated by a description and drawing of a third specimen from Madeira (Lowe, 1835b) which shows a dorsal fin profile characteristic of *A. ferox*.

N. B. Marshall has kindly examined two types in the British Museum. His observations leave no doubt that both are *A. ferox* as I understand it. In the specimen labeled "TYPES!" (no registered number) the standard length is 1125 mm., head length (to tip of lower jaw, as upper is damaged) 191 mm. (17%), dorsal rays 39 or 40, anal 17, pectorals 14. In the specimen labeled "SYNTYPE" (number 1852.9.13.98) the standard length is 1225 mm., head length 206 mm. (17%); snout 90 mm. (44% of head); dorsal 41, anal 17, pectorals 15. In both, the

dorsal origin is over or slightly behind the posterior edge of the operculum and no large, ocellated melanophores are present; both are larger than any *A. brevirostris* I have seen. The name *Alepisaurus ferox* is thus reasonably established for the long-snouted species.

Alepisaurus azureus Valenciennes, 1849. No type is extant, but the following parts of the original description strongly suggest *A. ferox*: ". . . la dorsale est d'égale hauteur jusque vers le trentième rayon . . ." (Cuvier and Valenciennes, 1849: 531); dorsal rays 38, anal 16. The pectoral count of 10 is presumably in error. The length of 5 feet 3 inches is larger than any known *A. brevirostris*. The description was based on a specimen from the Canary Islands.

Alepisaurus richardsonii Bleeker, 1855. Based on the description by Sir John Richardson (1844) of a head from Van Diemens Land. The drawing of the head shows a snout most like *A. ferox*.

Alepisaurus altivelis Poey, 1861. It is difficult to be certain of this description. The anterior rays are all said to be the same height, the posterior ones decreasing rapidly; dorsal rays 40, anal 17, pectorals 16; all most like *A. ferox*. The pelvic count of 13 is presumably in error. Based on a Cuban specimen.

Alpidosaurus borealis Gill, 1863. Based on a head, dorsal, caudal, and pelvic fins from a Pacific specimen. I have examined this specimen and find it close to *A. ferox* except for a dorsal count of 35. The pelvic count of 13 is apparently an error. The stated snout/head ratio of 2/5 definitely precludes *A. brevirostris*.

Alpidosaurus serra Gill, 1863. Described from a head, caudal, and pelvic fins of a Pacific specimen. I can detect no significant differences between Gill's descriptions of this species and of *A. borealis*. He places much emphasis on opercular sculpturing, which seems to be quite variable and not a good specific character. Again the pelvic count of 13 is presumed to be an error. The distance from eye to snout, stated as 2/5 of head length, excludes *A. brevirostris*.

Alpidosaurus poeyi Gill, 1863. Described on the basis of drawings (which I have not seen) of the second specimen from Cuba mentioned by Poey (1861) in his description of *A. altivelis*.

The specimen was described as having the first dorsal rays becoming longer, the fourth very long, rays 6-24 high and equal. This suggests *A. ferox*, as does the dorsal ray count of 41. Poey's presumably erroneous pelvic count of 13 is restated.

Alepidosaurus acsculapius Bean, 1883. I have examined the type and find it similar to *A. ferox*. The dorsal rays could not be counted accurately, but Bean (1883) gave 39; anal rays 16, both *A. ferox* characters. The snout length (41% of head length) rules out *A. brevirostris* with absolute certainty. Described from a Pacific specimen.

Distribution of Alepisaurus in the Atlantic. Among the specimens examined and definitely identified, the most southerly was one *A. ferox* from off southern Puerto Rico, now in the Museum of the University of Miami Marine Laboratory. Several of the same species from the Gulf of Mexico are in the U. S. National Museum, and specimens from the Gulf of Maine (La Have Bank the most northerly) were seen at the Museum of Comparative Zoology. The remaining positively identified specimens of *A. ferox* and all those of *A. brevirostris* are from the region of the Gulf Stream (*sensu stricto*), almost all collected by the M/V DELAWARE. Some authors have documented their records well enough so that *Alepisaurus ferox* can be said with certainty to be found in the following additional regions: Madeira (Lowe, 1835a; Maul 1946); Canary Islands (Cuvier and Valenciennes, 1849); Cuba (Poey, 1861); coast of North Carolina (Brimley, 1938; also a specimen in the U. S. National Museum); Greenland, Iceland, Faroes (Jensen, 1948).

In the long-lining activities of the M/V DELAWARE, both species were taken on the same set on several occasions. Surface temperatures at stations at which *A. ferox* were taken ranged from 69-83° F., for *A. brevirostris* 58-84° F. The buoy lines, attached to the end of each section of long-line gear, have been 10-20 fathoms long, mainly the latter; the specimens have thus been taken quite near the surface. It is noteworthy that, while *A. ferox* and *A. brevirostris* have been taken in good numbers in late summer and fall, they have been extremely scarce in June. The only spring specimen still available, though many were taken, turned out to be *A. brevirostris*. Only *A. ferox* was taken in winter.

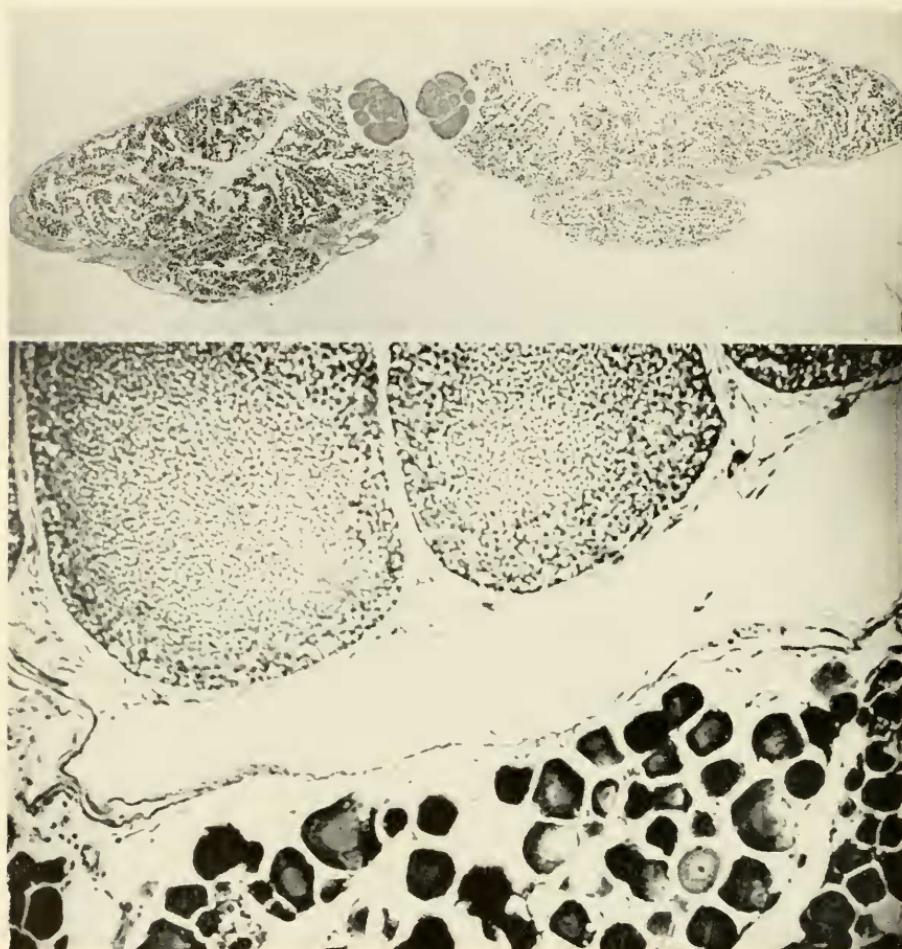


Figure 3. Gonads of *Alepisaurus ferox*, typical of both species. Top: cross-section through entire structure, testes the small, lobular structures in center. Bottom: enlargement showing two lobules of testis above and darkly-stained eggs below.

Reproductive Condition. When the possibility was being considered that the two species of *Alepisaurus* might be dimorphic sexes, gonads were immediately examined on all available specimens, and all others possible were thereafter inspected at sea and

many were preserved. All appeared to be immature females. No specimens even approaching ripeness have yet been seen.

Results of histological examination have shown the surprising fact that both male and female gonadal structures are present in both species (Fig. 3). The testes lie dorsal to the much-larger ovaries and in the groove between them. The ducts of both organs appear to unite before reaching the urogenital opening. When the testes are examined under oil immersion, meiotic activity is visible in peripheral cells of the crypts in spite of poor fixation. The eggs of the ovaries are fairly well-developed. The conclusion can hardly be escaped, therefore, that both species of *Alepisaurus* are hermaphroditic.

ACKNOWLEDGMENTS

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LITERATURE CITED

BEAN, TARLETON H.

1883. Description of a new species of *Alepidosaurus* (*A. aesculapius*) from Alaska. Proc. U. S. Nat. Mus., 5: 661-663.

BLEEKER, PIETER

1855. Over eenige vissen van Van Diemensland. Uitg. K. Akad. Wetensch. Amsterdam, 2: 31 pp.

BRIMLEY, C. S.

1938. The lance fish, *Alepisaurus ferox*, on the North Carolina coast.
J. Elisha Mitchell Sci. Soc., **54**: 245-246.

CUVIER, GEORGES and ACHILLE VALENCIENNES.

1849. Histoire naturelle des poissons. Vol. 22, pp. i-xx, 1-532.

GILL, THEODORE

1863. Descriptions of new species of Alepidosaurida. Proc. Acad. Nat. Sci. Philadelphia, **14** (1862): 127-132.

JENSEN, AD. S.

1948. Contributions to the ichthyofauna of Greenland, Spolia Zoologica Mus. Hauniensis, **9**(20): 114-116.

LOWE, R. T.

1835a. Description of a new genus of acanthopterygian fishes. Trans. Zool. Soc. London, **1**: 123-128.

1835b. Additional observations on *Alepisaurus ferox*. Trans. Zool. Soc. London, **1**: 395-400.

MAUL, G. E.

1946. Monografia dos peixes do Museu Municipal do Funchal. Bol. Mus. Mun. Funchal, **2**(2): 1-61.

POEY, FELIPE

1861. Memorias sobre la historia natural de la isla de Cuba. Havana. Vol. 2: 1-442.

RICHARDSON, SIR JOHN

1844. Ichthyology of the voyage of the HMS Erebus and Terror. London. Pp. 1-139.

Table 1. Fin-ray and gill-raker counts of *Alepisaurus*

	Dorsal Rays												Pelvic Rays					
	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	8	9	10
<i>A. brevirostris</i>										3	1	3	5	4	6	1	1	1
<i>A. ferox</i>					2		3	10	10	10	7	4	2	1		2	43	7
Pacific (USNM)	2	2					1				1					3	3	
Small											1					1	3	1
Anal Rays																Gill Rakers		
	13	14	15	16	17	18	12	13	14	15	16	23	24	25	26	27	28	29
<i>A. brevirostris</i>	1	9	12	1			1	13	10			2	3	4	1	1	3	2
<i>A. ferox</i>		1	14	21	15	1	1	5	30	16		1	4	4	5	2	1	
Pacific (USNM)			6	1				4	3									
Small			3	2						2	2	1						

Table 2. Proportional dimensions of *Alepisaurus* expressed as per cent of standard length. Range, with mean in parentheses. Based on seventeen adult specimens of each species and five small specimens.

	<i>brevirostris</i>	<i>ferox</i>	small
Standard length, mm.	551-894(670.6)	431-1088(777.5)	85.0-190.5(144.2)
Per cent of			
standard length			
Snout to anal origin	77.83(79.5)	76.88(80.1)	80.81(80.0)
Snout to pelvic insertion	42.50(46.3)	43.53(47.5)	53.58(55.3)
Snout to pectoral insert	13.16(14.7)	17.23(19.4)	22.25(24.0)
Snout to dorsal origin	9.4-13(11.4)	16.22(17.9)	21.25(23.2)
Head length	12.16(14.5)	16.23(18.6)	23.30(25.6)
Greatest depth	7.2-10.4(8.5)	8.0-12.5(9.5)	13.16(14.4)
Caudal peduncle depth	1.9-3.2(2.4)	2.3-4.0(2.8)	2.7-4.0(3.4)
Pectoral length	14.20(16.3)	17.24(20.5)	15.19(17.3)
Pelvic length	7.2-12.4(9.5)	7.5-10.4(9.0)	7.4-8.5(7.9)
Anal base	8.5-11.4(9.8)	9.2-13.8(10.7)	9.5-13(11.1)
Anal height	5.9-7.9(6.9)	7.4-10.3(8.6)	6.5-9.1(7.8)
Per cent of			
head length			
Snout to fleshy orbit	31.37(34.5)	41.46(43.3)	36.41(38.4)
Snout to bony orbit	26.31(28.4)	35.42(38.1)	27.37(31.4)
Fleshy orbit length	19.23(20.9)	13.20(17.8)	25.28(26.2)
Bony orbit length	23.33(27.8)	17.28(23.4)	31.36(33.4)
Least interorbital width	15.20(17.5)	14.18(16.2)	15.17(16)
Snout to anterior nostril	14.16(14.9)	21.24(22.4)	14.18(17.2)
Number of gill raker groups (total)	23-28(25.4)	23-29(25.8)	25-27(26)

Table 3. Principal differential characters of *A. brevirostris* and *A. ferox*

<i>A. brevirostris</i>	<i>A. ferox</i>
Coloration dark, more and larger melanophores, many of them ocellated (Fig. 2)	Coloration light, fewer, mostly small melanophores, few or none ocellated (Fig. 2)
Dorsal fin gradually arcuate, without free anterior rays (Fig. 1)	Dorsal fin with several anterior rays elongated, free from membrane; rest of fin about equal in height until sudden posterior drop, or slightly higher before drop (Fig. 1)
Irregular horizontal row of white spots often present on dorsal membrane	No white spots on dorsal membrane
Dorsal origin well in advance of rear margin of the operculum	Dorsal origin about level with the rear margin of the operculum
Head 6.5 or more in standard length	Head less than 6.5 in standard length
Snout 2.5 or more in head length	Snout less than 2.5 in head length